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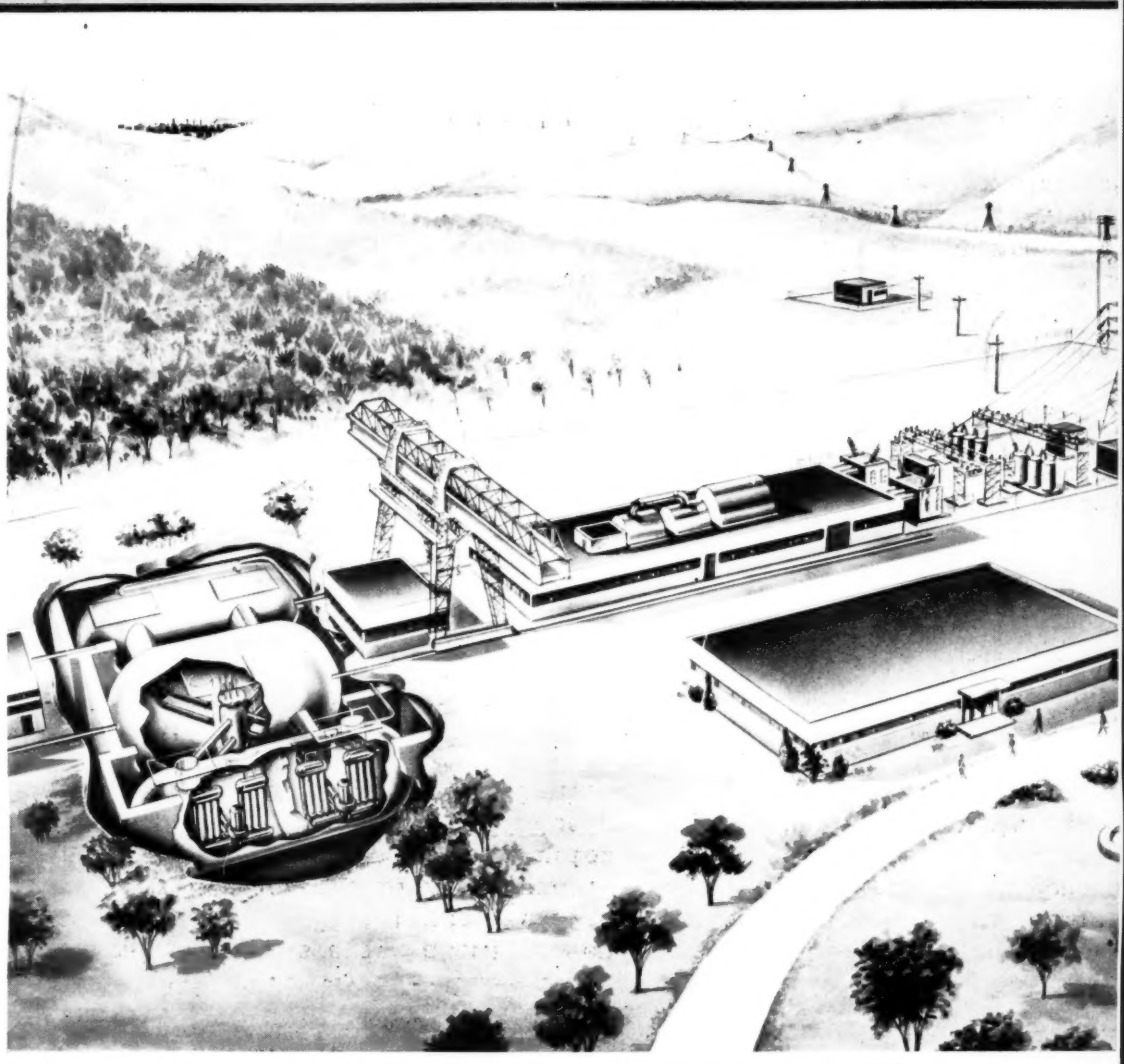

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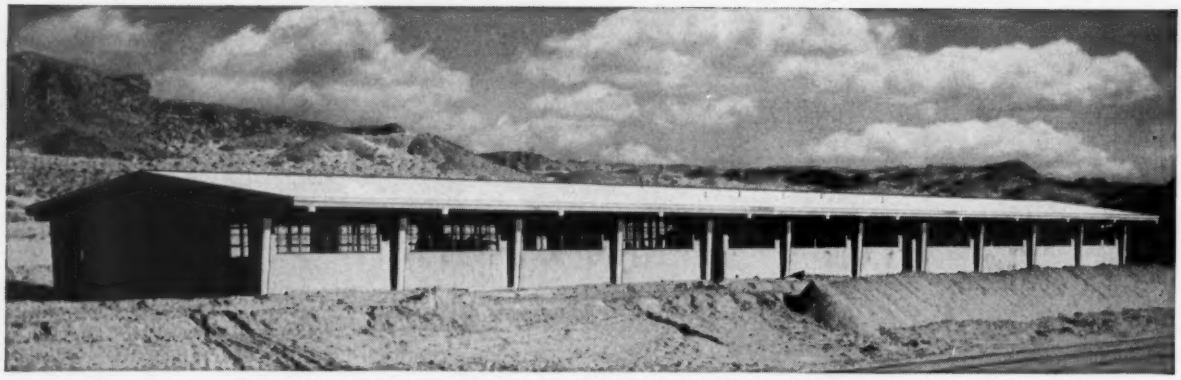
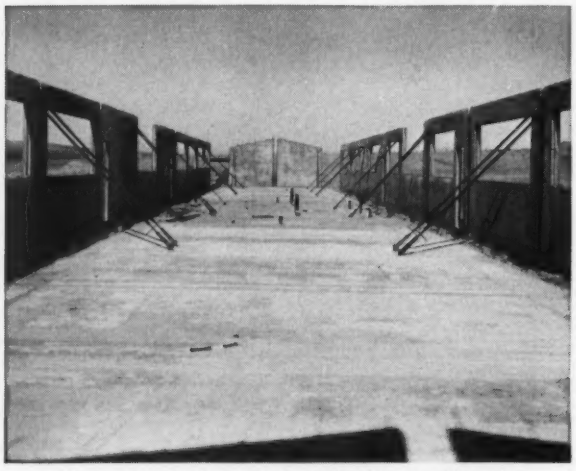
ENGINEERS HAVE WARY EARS—PAGE THREE

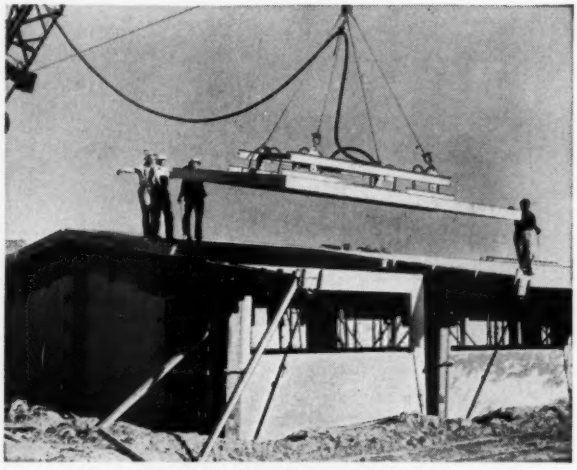
Vol. 7 JULY, 1954 No. 2



General view of one of the completed barracks buildings.



Construction view showing wall panels tilted up and braced.



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Engineers Have Wary Ears

By William V. Kahler, HM, WSE

Mr. President, Ladies and Gentlemen, Fellow Engineers:

I am greatly honored by your award to me of this honorary membership in the Western Society of Engineers, and by the gracious remarks of my friend, your president, Charles De Leuw.

The other evening I heard a man tell about the well-meaning alumnus who was attending his 25th college reunion. He met the vaguely familiar face of an old classmate and inquired about his wife.

"She's in Heaven," the friend said.

The man replied: "I'm sorry."

That didn't sound just right, so he added: "I'm glad."

Still feeling he hadn't said quite the right thing, he tried again with: "I'm surprised."

In receiving this honor, I'm certainly not sorry—I assure you I am glad—but mostly I'm surprised. It means a great deal to me that you thought it appropriate to associate me, accomplishment-wise, with such renowned men as Ralph Budd, Henry Heald, Wilford Sykes and others of the Honorary group who have distinguished themselves over the years as Western Society members.

I am aware, as you are, that whatever I have been able to accomplish for this Society—for civic groups and—in fact—in my professional work—has been dependent upon the efforts of many other people with whom I've had the privilege of working. I am indebted to many for inspiration—for loyalty—and for assistance. I'd like to share this honor with all who have helped me over the years. To them—and to you—I humbly say thanks.

Tonight I should like to say a few things—briefly, all of you hope—about our engineering profession and the potential of its contribution to the community and to the nation. That brings me to my announced subject.

To me it's more natural to say that engineers have *wary* ears than any other kind. The well-known jingle ascribes other type ears to engineers. But tonight consider with me the fact that "Engineers Have *Wary* Ears."

I assure you that in this connection the adjective is meant to be quite complimentary. *Wary* means being *cautious, watchful* — it means being on guard against deception—it means being suspiciously prudent. All these are marks of a good engineer.

You wouldn't think of hiring a young engineer who didn't have a certain amount of wariness in his makeup. One who is careless with his slide rule, depends too much on it at the expense of judgment or who is apt to listen to some glib talker and specify untested materials or equipment for a job, would be a liability in any engineering organization. Yes, *wary* is a pretty good adjective to apply to engineers. We don't take things for granted: our approach to things is usually practical: we pretty well keep our feet on the ground.

I have a theory that this wariness, which is a good thing in that it keeps engineers from making too many errors, also works against them. It tends to keep them aloof from good causes and thus from measuring up to their full stature as citizens. Let me illustrate.

Most of you, like myself, went to a technical school in which little time was spent on non-engineering courses of study. What with trig and calculus, physics and chemistry, and all the courses required for a purely engineering degree, there just wasn't enough time in four years for anything else.

And even if there would have been time, we were inclined to think that those who took literature—art—philosophy — history and psychology — were wasting their time. We remember how the lawyers—the journalists—and the commerce school boys re-phrased that jingle about our ears. And we also know what *We* thought of them on our side of the campus. Some of it couldn't be published.

I don't think we realized it at the time, but *right there on the campus the line was being drawn that separated many of us who were dealing with material things from those who were dealing with words and ideas.*

In recent years, as most of us realize, a lot of work has been started to correct this. Some of the pressure has come from business itself. Our own Western Society has helped, through the various courses offered in its Educational Program, to provide much needed supplement to the technical training of our members.

Let me illustrate this from the standpoint of business by drawing on experience in Illinois Bell. Several years ago my own company and others in the Bell System began giving human relations courses to hundreds of its management people, a great many of whom are engineers, with technical backgrounds. We also began spending more and more time in discussing management problems so as to give our people a broader view of business.

You may be interested in two further developments in the Bell System's management training program. One is the holding of a series of month-long executive conferences, attended by some 40 department heads. The program has a director and a staff. There are three main elements to the course: case study and background reading—small group discussion and case analysis—and lectures and discussions with recognized authorities in the fields of economics, social relations, and general business management.

The second recent development is an experiment with the help of the University of Pennsylvania, in which 17 division-level men, including two from Illinois Bell, are taking a special 8-months' seminar in the humanities. Now

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Mr. Kahler, president, Illinois Bell Telephone Company, presented this address before the Annual Meeting of the Western Society of Engineers on June 7, 1954, at the Society's headquarters in Chicago. Honorary membership in the Western Society of Engineers was conferred upon Mr. Kahler at the meeting.

I'm sure we can't spare many men from the business for this length of time, but out of this experiment the Bell System and the University hope to learn some additional things that might be done to improve the training of technical people.

With encouragement from business firms and from the engineering profession, technical schools themselves have been re-arranging courses and requirements so as to give young engineering students at least a broad, general view of the social sciences before they complete their university education. You may have noticed an announcement recently that the Illinois Institute of Technology is cooperating with 19 midwestern colleges and universities in presenting a 5-year course combining liberal arts with engineering. That's a movement in the right direction. Some other schools like Yale have merged their undergraduate engineering schools with their liberal arts college.

So there's hope that those who follow us in engineering will develop ears that are cautious and wary—and yet tuned to develop a broader viewpoint than we had as graduates of our purely technical schools.

When we went into the business world I'm sure we carried along with us many of the prejudices of our training on the campus. We busied ourselves in planning and designing, in building and producing things which would improve the comfort and well-being of people, quite oblivious of the welfare and social problems in the world about us. We were inclined to leave such trivia to folks who came from the other side of the campus.

The late John Mills of the Bell Telephone Laboratories wrote a controversial book, *The Engineer in Society*, published a few years ago, in which he pointed out that the social effectiveness of the engineer today is almost entirely indirect. He said, and I quote, "The engineer seems to have little concern whether his products are utilized for general welfare or for violent destruction. To politicians he delegates responsibility for their use, and he rarely subjects their decisions to the same critical analysis to which he puts the data of his engineering experiments."

Mills went on to say that perhaps, after all, the world wouldn't be any better if the scientific point of view were more universally adopted and adhered to. Perhaps engineers have been right to think that their job is to make things with less labor—and to make available a larger number of kilowatts per capita and so forth—and that that is the way to contribute to a better and happier society.

But there is a curious coincidence, borrowing further from Mills, between the most productive technology ever reached—that of the last five decades—*and* the two most disastrous wars of history—one of the widest spread industrial depressions—and now the fear of global atomic war. Statesmen and lawyers, clergymen and philosophers, businessmen and ignorant populaces, all have had a chance, practically free from interference by engineers and scientists, Mills says, to show what they could do. I agree with him that now it's time to give the engineers a chance. But it won't be given to them unless they reach for it.

The starry-eyed dreamers desperately need the aid of the hard-headed engineers. Given that aid, I question whether there are limits to what might be accomplished if engineers put their minds to the task and apply their principles.

I've had to push myself toward this point of view, but the way I look at it is this: We have just as much at stake as every other member of society, and selfishly or altruistically, we had better spend more time and mental energy on its protection. Our world is not just a world of things. It's also a world of ideas and ideals.

Let me show you what I mean. Somewhere in Communist Russia tonight a similar group of engineers may be meeting. Maybe they're awarding an honorary membership to Ivan Kaleravitch. We probably would find we had many things in common with them as professional engineers, but would we feel at home in their kind of a world? Of course not—there are oceans between us when it comes to ideas and ideals. One way in which we can effectively fight Communism, without firing a shot, is by clearing up some of our own social problems and thus strengthening our typically American institutions. And the place to start, obviously, is right here at home.

I have time tonight to tick off only a few of the social problems here in Chicago and in neighboring communities that very much need help from the engineering mind. It's an all too-familiar list . . .

The first is the problem of *slums*. Maybe they're no different from the slums in other large cities, but that doesn't excuse us. We must admit they're a blight, and that blight spreads. There's problem No. 1 calling, if you will, for some social engineering.

What causes slums to grow? I wonder if it isn't compromise with, or failure to apply, engineering principles. Part of the responsibility is ours, collectively. The question I'd like to raise is that of the civic consciousness of the engineer. Take the Fort Dearborn Redevelopment Project announced a few months ago. So far it's mainly the brainchild of people outside our profession. I'm sure that engineers can contribute greatly to it and to other phases of the slum problem that call, if you will, for some *social* engineering.

A second challenge to the engineer

(Continued on Page 12)

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Tool Engineering

By Leslie B. Bellamy

Tools have been aptly defined as "anything that will multiply the effectiveness of man's efforts." A tractor is a tool. A factory is a tool. So is a lathe, a drill, or a gage. It is in the creation of "tools" that the United States has led the rest of the world. Scientific creation and application of ever better tooling has made it possible for us to achieve the highest standard of living the world has ever known. Our tools have given man not only the necessities of life—on a far more abundant scale—but also have provided him with countless luxuries. So well has man accepted these luxuries that many of them have become and are considered essentials, today—automobiles, bathtubs, telephones, and so on.

More than this, our tools have made it possible for man to enjoy the fruits of their creation and utilization. They have given him a freedom and a leisure never before known.

Perhaps, you may say, these things represent material welfare and only that. Gentlemen, I cannot agree with this viewpoint. I never have. We are seeing today, and I believe will see increasingly in the future, a development of man's cultural and spiritual welfare closely paralleling that of our material benefits. I believe that future history will show that if you give a free man the opportunity to obtain his material needs through less effort and less time, that he eventually will learn how to use his excess time in improving himself, socially, culturally and spiritually. That is one thing tools are doing. They are providing man with a new freedom—the freedom to grow and develop as an individual.

If I appear to be straying too far from my assigned subject, please forgive me. I do not think it is possible to discuss the enormous changes brought about by tool engineering without at least a reference to their social and philosophical implications. It is true that our daily efforts as tool engineers are devoted ostensibly to the furtherance of a highly mechanistic art or science. Yet not even in so technical a project as the design of a new machine tool can we forget all social considerations. Do we not have to remember that we must provide "safety"? Do we not make every effort to insure that the machine will require as little physical effort to operate as possible? We are so accustomed to doing things like this, that we do not even remember their social implications. Any time we set out to provide better tooling, we must not do so at the expense of the man who uses those tools.

Tool engineering is, of course, an ancient art. Anyone who created or applied any kind of a new or better tool since the world began has been, in a manner of speaking, a tool engineer. That goes pretty far back. Back to the stone club, the spear and a flint. Why has it been, then, that until recently the tool engineer went unrecognized, with not even a technical society of his own? I believe the answer lies in our failure to recognize the actual importance of tools in themselves.

The recognition that the scientific development and application of tooling was a distinct profession, by itself, dates back only to the advent of mass production. Mass production has been defined in many ways. Some call it "production of interchangeable *parts*." Others refer to it as the manufacture of identical *products* on a large scale. Both of these definitions are true in their way, but they leave out the one essential element.

Mass production, I believe, is inherently "production for the masses." Interchangeability of parts, similarity of all finished products of the same type, are merely the means to the end. Without that interchangeability and standardization of assembly, production for the masses would be impossible from any economic consideration. Without production for the masses, interchangeability and standardization would be relatively meaningless.

It was not until well into this century that the basic concepts of mass production and tool engineering became fairly generally accepted. It was tool engineering which changed the automobile from a rich man's plaything to something everyone could and does own and use. Tool engineering created the processes, the machines and other tooling by which each part of the automobile could be produced by the thousands and millions, each one exactly like the other. It was the tool engineer who conceived and created the idea of assembly lines where all the different parts came together, to be assembled quickly without trouble or "fitting."

What tool engineering and tool engineers did for the automobile, they did for practically every other of today's mass production industries — television and radio receivers; electric lights and chemicals; bathtubs and plumbing ware; stoves and washing machines; cameras and motion picture equipment; golf clubs, fishing rods and reels; bowling pins, balls and alleys; eye glasses, clothing and shoes—practically everything the mass ownership of which we take for granted today. It was the tool engineer who conceived the methods and machines by which tractors, combines, harvesters and other agricultural equipment could be built at low cost in large quantities, so that the farmer could raise 20 times as much food as he could with an ox-drawn plow—and do so with far less physical effort.

The tool engineer found the ways and means of making tin cans so cheaply that they can be used once and then thrown away. Thus he made possible the distribution of low-cost canned foods. More recently he has developed methods, machines and equipment for quick freezing of foods at low cost.

Mr. Bellamy, president of the American Society of Tool Engineers, presented this talk before the Symposium on Tools of the Centennial of Engineering in Chicago on September 5, 1952. The talk, most of which is reprinted here, is used by permission of the Centennial of Engineering, the collected talks of the Centennial being available in bound form from the Museum of Science and Industry, Chicago.

Without tool engineering, we could not have our network of roads and paved streets. The tool engineer had to create the ways and means to produce road building equipment, graders and cement mixers, in such quantities and at such prices that contractors, communities, counties and states could all afford to use them. He created machines that require practically no skill to operate. He thus has made it possible for the untrained factory worker to earn wages far beyond those of the most highly trained and skilled artisan of bygone days.

He has gone a long way in liberating the house-wife from the slavery and drudgery of the past. Today, married women are becoming more increasingly referred to as "homemakers" rather than "housewives." There is a lot of truth in this change in terminology. Not so long ago the average woman frequently was more married to the house than she was to her husband. She had very little time for him particularly after she got through with the children on top of everything else. Today, the house does not run her, as much as she runs the home. The tool engineer has given her the opportunity to do this by putting within her reach, at low cost, such things as vacuum cleaners, washing machines, electric and gas stoves, automatic stokers and oil burners, inside plumbing, electric irons, food mixers, garbage disposal units, sewing machines and—let us not forget it — the crank-operated can-opener.

Tool engineering has changed our whole manner of living. Without the tool engineer our suburbs would have remained farms, swamps or forests. True, there would have been a few scattered estates beyond the boundaries of the city, belonging to the extremely wealthy. But, imagine suburban life without its myriads of telephones, automobiles and school busses, without trucks to deliver goods, without lawn mowers or bicycles for the young fry.

Certainly every one of the items I have mentioned could have been produced without the application of tool engineering. But the quantities would have had to be so small that the cost of each would have been far out of reach of the average citizen. Without tool engineering, wealth, leisure and the freedom to develop socially and every other way would have remained largely the privilege of the so-called chosen few.

No, there is no arguing the contention that our modern civilization has a technological foundation. If that has an opprobrious connotation to anyone, the fault lies with the individual. He has failed to understand it. Technology has not created our civilization. Our civilization has created it. The machine is not the master of man. Man is its master. Much as our historians keep telling us that the abolition of slavery was the result only of moral progress, they are, I am afraid, only partly right. The machine did much to abolish slavery. It made the care and feeding of slaves economically unsound. Tool engineers had as much to do with it as Abraham Lincoln and the abolitionists. The tool engineers were less vocal. They still are.

One of the outstanding characteristics of every civilization has been the birth and development of specialized professions to meet the specific needs of that civilization. Our modern technological civilization is no exception. Tool engineering of course is not the only new profession to which it has given birth. As you so well know, we have mechanical and electrical engineers, metallurgical and chemical engineers, civil engineers, radio and television engineers and still many others. Each of these groups represents a well defined and well established profession today. I doubt whether this was true in the early days of each of the professions. Rarely is a new profession recognized or identified at or near the time of its birth. Sometimes centuries may have elapsed before a profession reaches a sufficient degree of maturity to achieve general recognition. As a matter of fact, even the members of a new profession rarely regard themselves as professional men. They tend to think of themselves as technicians — craftsmen — with perhaps a rather specialized knowledge or skill. This condition continues until some event sheds light on the professional character of the group. Before that event can occur, however, a few individuals in the group have begun to suspect that they were actually pursuing a profession rather than a craft.

They look around and discover that there are dozens, hundreds, perhaps thousands of other individuals engaged in similar professional work. They recognize that these others, like themselves, are using their brains rather than their hands in their daily work. It is this—using your head more than your hands—which is the mark of a professional man. A feeling of kinship develops between these men. They meet occasionally and exchange experiences and know-how. Gradually, more individuals join

(Continued on Page 24)

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Technical Writing for Engineers

By Hiram Brown

It is, indeed, difficult for one who has been out of college for a long time to know just what the schools are doing insofar as courses in technical writing are concerned. Furthermore, I am not an expert in the field of education. I shall, therefore, attempt only to discuss some of the factors associated with technical writing as they apply to industry and to the Engineers who will enter the industrial field. Those who are experts in the field of education may from this discussion be able to evaluate their respective curricula.

There are two assumptions frequently made which to me are fallacious. One is the opinion held by many persons —including Engineers—that if Engineers are technically competent they do not need to be proficient in the art of good writing. The second is the idea that, given all the pertinent data concerning a particular subject, any technical graduate can prepare a clear, concise report. Nothing could be further from the truth.

In industry there is great demand for good technical writing, and the supply is short because such artistry is difficult to achieve. There are few types of writing which require more skill or greater mastery of the fine points of writing. This probably seems to be a rather presumptuous statement, but there are a number of factors which would support the claim.

Since most technical writing in industry represents some form of report let us first consider the function a good report may be expected to perform. It must transmit information to many levels, through many channels, and must be designed for both vertical and horizontal communication. For example, a single report of importance may be circulated to all levels of personnel from shop foremen to top management, to other technical departments, to the customer, and even to government bureaus.

It is one thing to communicate with other engineers where technical terms can be freely exchanged. It is something else again to make technical ideas understood by non-technical people where any highly technical terms would be mere gibberish to them. This is particularly true where transmission of ideas must be done by remote control as is the case in written communications. To be successful in this endeavor requires consummate skill.

A great deal depends upon the ability of a report to be understood by all recipients. The foreman may depend upon it to point out the cause of his difficulty. Top management may depend upon it as a report of progress, an indication of possible danger or financial loss, or as a guide for future product design or planning. The customer may regard it as an evaluation of the work being done by the sub-contractor. The government bureaus may require it as evidence of compliance with specification requirements, or as the end product of a large scale research project. The esteem in which a company is held is directly related to how well the company can tell its story. The rating of the engineer, in turn, is directly related to how well he can present his story. Most technical men aspire to leadership in their field. Attainment of this goal is virtually impossible without the ability to record ideas and to communicate with others.

In order for companies or individuals to succeed they must be able to attract attention to their efforts and to gain respect for their achievements. Only then can they influence the actions or attitudes of others. It is a maxim that to get action you must first get attention. If you have something to say it must be interesting enough to cause someone to want to read it. This means it must be simple, accurate, well expressed, properly spelled, and as brief as the subject matter will permit. It must not be dull and ponderous. It must present the entire story in an orderly and logical sequence so that the reader will be assured of continuity of thought with a minimum of digression. To ramble aimlessly without purpose or to constantly take off on side issues is a sure way to lose the interest of the reader. Most people are very busy and they will not take time to read anything unless it can be read and understood with a minimum of effort. Thus the outline of a technical story must be as carefully planned as the plot of a novel. Yet many engineers stumble over this barrier before they get under way.

Brevity and simplicity are the soul of good technical writing for industry. Writing should be done to express rather than to impress. Engineers may say that they can't write a good report if they are not permitted to use the proper technical terms. This is, of course, nonsense. Technical terms are a form of shorthand which is understood by the individuals of a particular profession, but requires translations for the layman. There are three essentials to successful translation: (1) The engineer must thoroughly understand his subject (not just have it memorized), (2) he must know what he wants to say, and (3) he must have a good vocabulary and must understand the fine differences in the meaning or intent of words. No mechanic would be very successful if he did not own or know how to use wrenches. In the same manner, words are indispensable tools for engineers. Good basic English, including spelling, is the cornerstone of good writing.

Mankind progresses only when it takes advantage of the apperceptive knowledge of humanity — that knowledge which already exists. Today's work is based upon the results of work performed yesterday. Not until man was able to record his accomplishments could other nations and other generations benefit from what had already been done. That is why printing was such a valuable contribution to mankind.

Just as an engineer profits from past records, so he must leave an accurate account of his accomplishments for

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Mr. Brown, Company chief metallurgist, Solar Aircraft Company, Des Moines, Iowa, presented this talk at the Annual National Convention of the American Society for Engineering Education held at the University of Illinois at Urbana on June 14, 1954.

those who will follow. Therefore, unless his reports say what he means to say they are worthless. It should be remembered that his written words will long outlive him, and if properly stated may give someone a good foundation to build upon. If some common denominator such as good basic English is not used, picture the confusion that could exist. If slang, technical terms, colloquialisms, or poor spelling formed the framework it would require a series of Rosetta stones for one group or one generation to understand another.

Some phase of English, grammar, or writing should be required in every year of the college curriculum. The command of English so necessary for good writing is something that is not learned by rote. Such knowledge must be absorbed through constant exposure and practice so that its use becomes natural. If the writer must be constantly trying to recall memorized rules he will have little facility in writing, and will lack the sparkle and spontaneity that comes from confidence and mastery of the subject.

It is well realized that not all who are subjected to constant exposure will become proficient writers. There are, similarly, always some graduate engineers who never rise above the rank of technician. That, however, is no excuse for neglecting to expose them to anything which will contribute to good writing. If it is made a required part of the curriculum it might be surprisingly effective.

In regard to the very special subject of technical reports some definite suggestions are being offered which may be helpful.

It may appear to be difficult to prepare a complete, orderly report which will be readable at all levels and yet contain all of the technical data necessary for future reference. A standard outline such as the following might resolve this problem.

First, have a section labeled *Purpose.* This can tell briefly why the work was done, at whose request, and what the problem is that is being investigated. Ability to define the problem is a prime requisite whenever technical assistance is to be rendered.

Next, have a section labeled *Summary.* This can give a concise, simply worded abstract of what was found, its probable effect, and any recommended action to be taken. Every shop problem cries for a solution and recommendations for corrective action are expected. This section should be a capsule for those who merely wish to scan the report.

This can be followed by a section labeled *Procedure.* This may list the equipment and technics used. The readers will want to know whether the data were obtained from practical tests or from laboratory experiments.

Then can follow a section labeled, *Results and Comments.* This may be a longer explanation in more technical terms of what was discovered, what the conclusions were, how these conclusions were reached, and more detailed recommendations as to what action should be taken. This is of value to those intimately concerned with the subject of the report.

Last of all there can be an *Appendix* which contains all tables, charts, photographs, and illustrations. This is primarily for future reference or to allow a thorough analysis of the work by other qualified technical personnel.

Such a report will serve all levels. Busy management can read the summary. Interested shop personnel can read more of the details that apply to their problem. Technical personnel can read the entire report, analyze the data in the appendix and decide their course of action. It should be pointed out that even in such reports technical words should be kept at a minimum and even then used only after making their meaning clear to all concerned.

Thus the subject of good technical writing is a very challenging one, but one which can be most rewarding when skill is achieved. But, again, I repeat, "It isn't easy, and it is achieved not by sporadic bursts of English but by continued exposure and use."

IIT Will Give Course On Nuclear Energy

A graduate course in the application of nuclear energy to industrial uses will be offered this fall in the evening division at Illinois Institute of Technology, Chicago.

The course, called Nuclear Engineering, is being offered because of the increasing interest and possibilities in power from atomic energy, according to Dr. Ralph E. Peck, director of the chemical engineering department.

It is designed for students who hold B. A. degrees in engineering and have completed differential equations.

The course will be taught by Dr. Walter Fagan, who helped develop the atomic-powered submarine *Nautilus*. Dr. Fagan was educated at Illinois Tech, where he received his doctorate in chemical engineering in 1949. He also studied at the University of Illinois.

Dr. Fagan is now engaged in research at the American Machine and Foundry company, Chicago, and formerly worked as a chemical engineer for Argonne National laboratory.

The course will cover subjects involved in the application of nuclear engineering to atomic power plant design. A four-credit course, it will be given two nights a week.

Registration for the course will be held from 6 to 8 p.m. on Friday, Sept. 17, at 3300 Federal street, with classes beginning the week of Sept. 20.

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Museum Holds Hardwoods Show

A $400,000 Hardwoods Exhibit at Chicago's world-famous Museum of Science and Industry is one of the outstanding tourist attractions in the windy city.

This industry-sponsored project at the Museum has been a "must" for tourists, vacationers and students, and should be of especial interest to engineers. During 15 months of operation, the exhibit has been viewed by nearly two and one-half million persons—two-thirds from outside the Chicago area, according to the National Lumber Manufacturers Association.

Covering about 10,000 square feet, an area equal to the floor space in 10 to 12 average-size houses, the exhibit contains dramatic examples of the hundreds of ways in which hardwoods serve the nation's population.

Numerous audience participation units, action displays, movies, recordings, and lavish use of lights and color add interest to the exhibit.

A hit with youngsters and adults, alike, is the Hall of Hardwoods which contains full-size 3-D color scenes from the life of Skeezix, the popular comic strip character. The scenes trace the influence of hardwoods on Skeezix's life from the time he was found in an elm basket on a wooden doorstep, through his infancy, school days and military service, to the time he and Nina shopped for furniture for their new home.

Equally popular with the younger set is a special room in which America's woodland folklore comes to life. This room, finished like the interior of a log cabin, is constructed at a tipsy angle to give the impression it is being tilted by Paul Bunyan, legendary hero of the lumber industry. Bunyan's seven-foot-high face peers through one of the windows while he tells tall tales of his experiences in the North woods during pioneer days.

The first display that greets visitors to the exhibit is a huge "talking tree"—a stately white oak which, through a recording, explains how a tree lives and grows. The physical makeup of the tree is illustrated by ingenious use of lights and drawings.

Other highlights of the exhibit include:

1. A demonstration of how the home handyman can make beautiful and useful articles from hardwoods.

2. A wall paneled with 85 types of hardwoods, each clearly identified to show the wide variety available to the consumer.

3. Scale models of a sawmill, veneer mill and plywood plant that simulate actual operations of these facilities while a sound-color movie is projected in the background.

4. A large globe encircled with a band of 48 different wood panels, each with a pushbutton. Visitors can press these buttons and light up tiny pin-lights on the globe indicating the native locale of each hardwood species.

5. The "office of 2,000 A.D.," which illustrates the beauty and utility of hardwoods in business places. An executive's desk in the office features drop-leaf sides that raise to form a 10-person conference table, and convenient top-of-the-desk storage bins that disappear into the desk to leave a flat working surface.

Other displays show how hardwoods may be used in every room of the home—for flooring, furniture, paneling and scores of other items.

Also featured in the exhibit are displays of the adhesives and other raw materials that go into the manufacture of furniture and hardwood plywood; the role of hardwoods in modern warfare and defense; a history of hardwoods dating back to the days when the Egyptian Pharoahs first used plywood and veneers; and reforestation practices designed to insure a perpetual supply of hardwood timber.

The exhibit is sponsored by more than 175 individual firms and lumber industry associations such as the Fine Hardwoods Association, Hardwood Plywood Institute, National Hardwood Lumber Association, American Walnut Manufacturers Association, Mahogany Association, Birch Club and National Oak Flooring Manufacturers Association.

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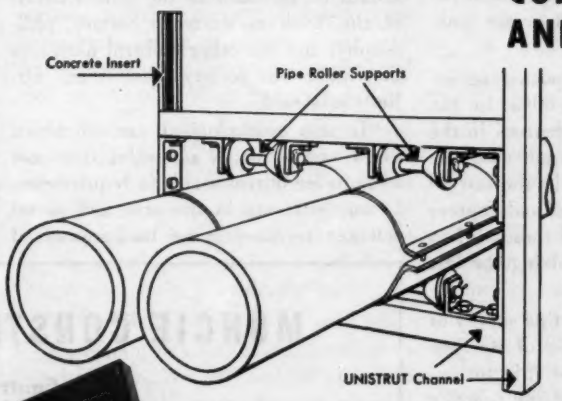

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ECPD Surveys Professional Degrees

The Recognition Committee of the Engineers Council for Professional Development, under the chairmanship of R. H. Barclay, has completed a survey of the awarding of the professional degree by various engineering institutions. The survey, with its excellent response—of the 146 institutions sent questionnaires 142 responded—will serve as a basis for formulating recommendations concerning the practice of awarding the professional degree as a means of professional recognition.

Of the engineering schools surveyed, 86 award the professional degree while 62 do not. Of the 86 awarding the degree, 74 use professional experience as a basis for awarding the degree, 8 require resident graduate study and 4 include both professional experience and resident graduate study as prerequisites for awarding the professional degree.

In regard to their future plans concerning the professional degree, 69 colleges will continue awarding the degree, 2 will institute the professional degree, 13 will abandon it, 49 will continue not to award it, and 17 are uncertain as far as future plans are concerned. The survey shows that approximately 1/5 of the schools offering the professional degree have either dropped it or are making plans to do so.

The Committee also reported an increase of approximately 80% in the awarding of professional degrees in the last five years as compared with the previous five-year period. In the last 10 years, 1387 to 1398 professional degrees have been awarded, and of these, 917 to 922 have been awarded during the last five years.

The Committee believes this survey to be the most comprehensive of its type ever undertaken and will use it in formulating recommendations on the practice which they believe should be followed in respect to awarding the professional degree as a means of professional recognition.

Wonders of Science:

Some one has invented a hollow moth ball for the girls to keep bathing suits inside of.

Technology's Role Said Misunderstood

Misunderstanding of technology's role in modern life is behind today's paradox of continued uneasiness and uncertainty despite increases in leisure time and material comforts, John T. Rettaliata, MWSE, and president of Illinois Institute of Technology, said on May 3.

"Because of this misunderstanding we are surrounded by doubt and fear—fear of the machine, fear of change, fear of technological unemployment, fear of domination by large corporations," Dr. Rettaliata told the Electrochemical society at its spring meeting in the LaSalle hotel, Chicago.

"These fears arise because technology is not well enough understood by the man and woman in the street," he said. "Particularly mysterious to them are the ways in which modern technical processes are brought into being and their products made available to the public."

The Illinois Tech president said the fear of technology must be overcome and that one effective way of doing it is by making science and technology integral parts of education from grammar school through college.

Technology's function in society should be included in the school curriculum "even as we teach history, philosophy, and the other cultural heritages that make our society what it is," Dr. Rettaliata said.

"In this technological age, of which every one of us is a part, it does not seem to me unreasonable to require each of our students in the arts and social sciences to have some background of technological study," he said, "at least enough so he can understand our dependence on technological advances."

"Looking-at" Methods To Be Looked At

New developments in light and electron microscopy will be aired at two conferences scheduled for Oct. 11-16 at the Moraine hotel in Highland Park, Ill.

Armour Research Foundation of Illinois Institute of Technology, Chicago, will hold a symposium on light microscopy on Oct. 11-13, followed by a three-day symposium on electron microscopy sponsored by the Electron Microscope Society of America.

The meetings will be coordinated in order to provide for an exchange of the latest knowledge gained in microscopy, according to Dr. Walter C. McCrone, senior chemist at the Foundation and chairman of the light microscopy symposium.

This year marks the first time an entire week is being alloted to meetings in light and electron microscopy. The two groups have held shorter symposiums in previous years.

Results obtained using more recently developed techniques such as reflection optics, interference microscopy, and the use of television receivers in microscopy will be emphasized in the light microscopy symposium.

The light microscopy meeting will be broken into five half-day sessions, each under the direction of a chairman and a group of from four to eight experts in the field, McCrone said.

An interesting feature of the symposium will be the use of traveling microphones for audience participation.

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Men Who Play God

By William L. Everitt, MWSE

Some fifteen years ago I was impressed by a movie called "The Man Who Played God," with George Arliss in the leading role. The theme concerned a particular type of wireless communication. The hero was a wealthy musician who had lost his hearing. At first filled with despair, he learned to read lips and applied his new-found skill to a unique and satisfying hobby. From his penthouse overlooking Central Park, by using a pair of field glasses, he, as it were, "listened in" on the conversations of people on the benches below. Frequently he learned about the problems of people who were in despair. His hobby was to provide anonymously for a material solution to their problems, apparently as though Heaven had intervened directly. Hence, the title "The Man Who Played God."

But in a different sense, do you realize that you, too, the members of the Institute of Radio Engineers are "men who play God?"

Being a minister's son, perhaps I can be excused if I take a text from portions of Genesis 1:27 and 2:7. "So God created man in His own image; in the image of God created He him." "And the Lord God formed man of the dust of the ground and breathed into his nostrils the breath of life."

Other engineers have created machines from the materials of the earth, which supplement man's muscles. But the electronic engineer has given and is giving to these machines sense organs, nerve systems, and reasoning power. He is putting into machines the "breath of life." He is creating them in his own image. These machines can collect and transmit information, can make comparisons between existing conditions and data stored in their memories, and can reach decisions based on either direct observations or statistical estimates of the situation. They have, in fact, eaten of the fruit of the knowledge of good and evil, but this knowledge is only what we build into them. If they show any signs of free will we put them in the hospital—I mean the repair shop. The analogies need not be developed extensively. You all have your own examples. Every day we hear of more and more machines which can supplement or replace man's brain power and sense organs as well as his muscles. As someone has said, "Machines are becoming so human they can act without using any intelligence."

Modern computing machines not only reach decisions quickly and accurately, when asked properly, but they also show nervous frustration if questions are propounded to them which they cannot solve. If the interrogator is not able to ask the question in sufficiently clear form to present all the elements necessary to reach an answer, these machines, by their erratic behavior, are themselves acting as critics of our logical processes, our own intelligence, and our command of their language.

Machines with built-in intelligence are recognized to be necessary for the security of the free world. We realize that we cannot match our enemy in numbers man for man. We don't have to—we aren't going to dance with them. Electronics must provide the answer to the dilemma.

We cannot be complacent, for there is yet far to go. We only see as through a glass darkly. Instruments may be used to diagnose ills, but machines cannot heal themselves. They cannot reproduce themselves. They cannot, as yet, invent and build new devices. While they often inspire love in their admirers, they cannot respond emotionally. We have much to learn on the impedance matching of machines and human beings. I heard of a man who would not wake up when his alarm clock rang. He bought a parrot to match the impedance. The alarm clock woke the parrot, and what the parrot said would wake anybody.

There is an old saying, "like father—like son." If we reverse this we get the prediction, perhaps ominous, "like son—like father." In making machines in our own image, let us make sure that they in turn do not make us machine-like. A wise man said, "God cannot be solemn or he would not have blessed man with the gift of laughter." We have not yet built into our machines a sense of humor, although some of them do make us laugh. Maybe we should give this more attention, but we must not take ourselves or our machines too seriously. Let us not lose our human sympathy and understanding, but rather let us use the economic gains resulting from our machines to help those who need help. And above all, let us not become pompous or arrogant from the sense of power which our slave-like machines give us.

I will close with a parable. A house builder was once badly in debt. He lost his own home. A wealthy friend, feeling he needed help, gave him a contract to build a fine house, then went away for a long trip. The contractor figured he might profit financially, and never be suspected, if he cut corners in the construction and used shoddy materials. This he did. When the friend returned home he said to the contractor, "I wanted to do something nice for you, and so I am giving you for your own this house you have built, for you and your children to live in. That is why I specified that the best of everything should be used, because I knew you could appreciate it."

This world of automation we are building is our world. Be sure that when you play God you do it reverently, thoughtfully and honestly, with full attention to the fact that you are building not only machines but a world in which you and your children are going to live.

Mr. Everitt, a member of the Western Society of Engineers, is dean of engineering, University of Illinois, Urbana, Ill. This is a portion of the response which he gave on accepting the Award of the Medal of Honor for 1954 conferred upon him by the Institute of Radio Engineers.

Wary Ears

(Continued from Page 4)

is that of *traffic*. This problem clearly has its origin in technological progress, and yet traffic jams are stifling all our communities, not only Chicago, but also the suburbs. I know that Western Society's Civic Committee has been interested in the engineering phases of our traffic problem. But are we really *doing* enough to solve it? We need not only to help develop some sound long-range plans, but we ourselves have to do a good part of the selling that's necessary to put these plans across.

Both this *traffic* problem and the *slum* problem have engineering as well as civic angles, but I have in mind two other problems that involve no engineering as such, yet they're of utmost importance. My third problem is that of *education and character building* for our youth. I link the two because I think more and more we are coming to realize that we must build character as we impart knowledge. The school boards —the character-building agencies—and the PTA's in your communities need your interest and your active help.

A fourth problem, and the last I'll mention, is the broad one of *public welfare and community service*. Progress has been made in recent years, but much remains to be done, particularly if *we* want to do the job, rather than see more and more of it taken over by government. Be it Red Cross, Community Fund, Jewish, Catholic or Protestant welfare groups, believe me they need you with your feet on the ground so they can keep theirs on the ground, too.

Because these problems are broad and complex, they are beyond solution by individuals and may be expected to yield only to co-operative effort. John Mills in his book puts it this way, "In such cooperation, scientists and engineers are well schooled. The organized knowledge which is the science of today is the logical aggregate of innumerable contributions. Most engineering accomplishments are the group products of many brains with common purpose."

As we think about these, and many other great social problems, and the contributions which engineers with *wary* ears can make to them, the name of a great engineer comes to mind, that of a former president of the United States, Herbert Hoover. His concern for people caused him to apply the down-to-earth talents he had displayed as an engineer to problems of human need and suffering, and later to government reform, with outstanding results.

I'd like to leave with you the story of a man who was walking down a dark street. As he came to a street lamp he noticed a youngster down on his hands and knees looking for something. The man stopped, inquired, and learned that the boy had lost a quarter.

"Whereabouts did you lose it?" asked the man.

"Across the street," replied the boy.

"Then why are you looking here?"

"It's no fun looking over there in the dark."

I think we're all a little like that boy. We pick our spots to work in. The dark ones don't have so much appeal—yet that's where the work is needed.

And so I would say to you, my fellow engineers, pick some good cause that is not getting the attention it needs, and apply to it the same engineering thinking that you've seen work in the solution of technical problems. You've learned not to expect technical miracles overnight. Miracles are even harder to achieve in the field of human relationships. *But without you in the field they may not be achieved at all.*

Windshield Gremlins Are Not Martians

Pitted automobile windshields are the result of normal wear, not the work of the H-bomb, cosmic rays, industrial sediment, or Martians.

That is the view of scientists who have been studying recent cases of "pockmarked" windshields in the Chicago area.

Talk about H-bomb effects merely has made people more observant about marks on their windshields, explained John Krc Jr., research crystallographer, and Dr. Walter C. McCrone, senior chemist, both of Armour Research Foundation of Illinois Institute of Technology, Chicago.

The scientists based their observations on the examination of approximately 25 samples of shattered and pitted windshields submitted for analysis by Chicago area motorists.

"We found the marks in nearly every case to be similar and several months old," Krc said. "There was no evidence that the damage was the result of radioactivity, cosmic rays, air rifles, or other such causes."

Gravel, dirt, or stones accounted for every particle scraped from the holes, they said.

McCrone and Krc do not believe new

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curved front windshields are more susceptible to flying gravel than older types.

"But when a curved rear window is hit, it may disintegrate more completely than a flat window," McCrone said.

The "mysterious" honeycombing of some of the glass samples apparently was caused by the same thing that produced pitting—stones thrown up by cars, according to the examinations.

Rear windows showed honeycombing, while front windows were pitted, the scientists explained.

Rear car windows usually are made of tempered glass purposely strained in construction to give structural strength. When the surface is broken, they said, the strain is released and the window disintegrates into a cobweb pattern.

Front windows, however, are laminated with plastic as a safety feature to prevent this. When these are hit the glass is likely to show pits rather than honeycombing, they added.

Clark Breaks Ground For Platforming Unit

Ground has been broken for the construction of a huge Platforming unit at the Blue Island, Ill. refinery of Clark Oil and Refining Corp., Milwaukee, Wis. The first commercial Platformer in the Chicago area, it is scheduled to go into full operation by early fall.

This unit, a catalytic reforming process employing a platinum-containing catalyst to upgrade low octane gasoline, is designed to produce a high quality motor fuel blending component. Emory T. Clark, president of the oil company, said Platformate will be blended to produce a 93 octane gasoline which the company will market through its own retail outlets.

Clark also is building 25 service stations in Chicago and suburbs to introduce Clark Super 100 gasoline to that market. The company now has its own outlets in Illinois, Wisconsin, Minnesota, and Missouri.

The Platformer, which will raise the overall octane number of the refinery's total gasoline production, was designed, engineered and licensed by Universal Oil Products Co. and is being built by Procon Inc.

Automation Training Urged of Educators

Leading American engineering educators were urged on June 18 in Chicago to modify their college curricula so that the engineers of tomorrow may be better trained in the concepts of automation.

That suggestion headlined the message delivered at a meeting of the American Society for Engineering Education by Roger W. Bolz, editor of the forthcoming magazine, AUTOMATION. Bolz was a keynote speaker at the close of the society's annual summer meeting and beginning of the summer session at the University of Illinois Navy Pier extension school.

The editor mentioned a number of gaps he felt ought to be plugged in engineering training courses throughout the country.

"Greater stress in engineering education should be placed on designing products for automatic production," Bolz said. "Design simplicity will naturally permit more extensive use of automatic methods."

Engineering schools might well deemphasize routine shop training for students and concentrate on shop processing details from start to finish, he observed. Students viewing the overall operation in this manner, Bolz reasoned, should be more familiar with procedures and therefore better able to design for economic and automatic production.

Bolz, who is a professional engineer himself, said he was not in favor of too much specialization in training engineers for the complexities of automation.

"Engineers should know and appreciate the whole problem, not turn it over to specialists. Recognizing the problem, they then need only know where to look for the information to find the solution," he said.

Knowledge of sound design principles should be tempered with the practical facts of manufacture, Bolz continued. The difference between success and failure . . . especially in the field of automatic production . . . may hinge on the ability of the engineer to design products capable of easy and economic manufacture.

"Much needs to be done to create a keener understanding of the added importance automation gives to interchangeability of parts," the speaker declared. He followed by urging educators to try to develop in their students a deeper appreciation for interchangeability and greater precision.

Embryonic engineers should also be schooled in the needs imposed by automatic production for low maintenance costs. With direct labor costs a lesser factor and indirect costs at a maximum in an automated industry, knowledge of preventive maintenance becomes extremely important, he said.

Growing automation, Bolz concluded, calls for better machines, less complex assemblies and greater use of standard parts. Without at least an awareness of these needs, the engineer of tomorrow will fail in piloting automation to greater deeds.

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CRERAR LIBRARY
News and Notes

The most recent in the series of exhibits set up in the W.S.E. street lobby has been devoted to Octave Chanute—engineer, inventor, and one-time president of the Society. Timed to coincide with the annual dinner, the exhibit also called attention to the award of the Society's Chanute Medal. Crerar was the recipient from the Chanute family of a large section of the scientist's papers, scrapbooks, and volumes. A selection of these is on display, including a handwritten translation, clipping folios, and other items by and about Mr. Chanute.

* * *

A great many telephone calls are received by the Library's two public reference departments. Detailed reports of these are not kept on a current basis, but a special survey during March of this year recorded 673 such calls received by the Technology Department and 219 calls by the Medical Department. Of the total of 892 calls in one month, 37.8% were inquiries concerning items in the Library's collection, 30.3% were inquiries classified as "quick reference" questions, 17.9% were orders for photoduplication service, 10.9% were reference questions requiring some research, and 3.1% were requests for inter-library loans. Companies and other agencies accounted for 681 of the calls; the remaining 211 calls came from individuals. Twenty-nine agencies called from five to twenty-two times during the month.

* * *

The American Electroplaters' Society—Chicago Branch, has made a grant of $150.00 to Crerar Library for purchase of current publications on electroplating. The Library has only recently invited such support from a number of special engineering groups in Chicago, and it is a pleasure to announce this early response to our proposal. It is hoped that similar action will be taken by other engineering groups. During the past several years, the grants received from societies and other scientific groups have provided very substantial sums for purchase of publications in medicine and chemistry.

Engineer Corps Ends Busy Year

Seventy construction projects valued at $45,500,000 were supervised by the Chicago District during the fiscal year which ended June 30, according to Colonel Philip F. Kromer, Jr. of the army corps of engineers. He said that substantial money savings to the government has been netted by economical use of personnel and adoption of streamlined business methods.

In addition, the district made improvements on the Illinois Waterway system, took necessary flood control measures, administered military supply contracts, and engaged in industrial mobilization planning operations

The engineer stated that examples of actions during the year which resulted in firmer economical operation included a change in shipping instructions which reduced freight costs by $100,000. A revamping of inspection policy developed a savings of $206,000. Operating costs were cut $22,000 a month through an agreement whereby plants took over from the local district the processing of shipping documents.

Additional credits in excess of a million dollars accrued to the government from payments for agricultural and other uses of lands on army installations which are under jurisdiction of the district, he said.

Works

The Chicago District of the Great Lakes Division plans and supervises military construction in Illinois and Indiana where it also operates and maintains waterways. Its functions extend into parts of Wisconsin and Michigan. The office is further charged with administering military supply contracts for all services in the Defense department within an allocated area.

The fiscal 1954 works of the local district was in line with the government's economy policy which limited new starts on construction of purely civil interest and allowed for projects supporting defense. An additional major task called for industrial mobilization planning which requires resolving complex production problems by direct contact with management.

Civil

While the bulk of the army engineer construction here during the year consisted of military projects, the balance of the work was held to maintaining and improving the waterways and to necessary flood control operations. In all cases the contracts were offered in competitive bidding.

Major General Samuel D. Sturgis, chief of army engineers, told a Vicksburg, Miss. audience during June that the U. S. is getting about two dollars back for every dollar it invests in flood control and water conservation.

Major repairs completed at Dresden Island Lock and Dam wound up a five-year renovation program for the five locks of the upper Illinois Waterway which included Lockport in 1950, Brandon Road in 1951, Marseilles in 1952, and Starved Rock in 1953.

Other waterways projects included, at Michigan City Harbor, an emergency breakwater repair, stone placement, and

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condition surveys; at the Farm Creek reservoirs, maintenance of the Fondulac and Farmdale Dams; and, at the mouth of the Sangamon River, maintenance and channel excavation. Flood control inspections were made at twenty-nine drainage and levee Districts which involved 177 miles of levees and appurtenance structures.

Military

District supervised work at the four air bases, Chanute, O'Hare, Scott, and Atterbury, included construction of concrete test cells, maintenance shops, remodeling, buildings, barracks, warehouses, 69 KV substation, U.H.F. air ground facilities, radio homing beacons, combination gas-oil heating systems, taxiway lighting, storm drainage systems, security fencing, engine build-up buildings, all types of utilities, squadron headquarters, boiler plants, training aids, maintenance hangers, dental clinic, radar facilities, water supply improvements, roads and parking areas, sewage lift stations, power and electrical distribution systems, and operational aprons.

Construction at other locations included at Hanna City, a sewage disposal plant; at Casad Engineering Depot, a general purpose warehouse and an equipment processing building; at Decatur Signal Depot, buildings for maintenance repair, salvage, inflammable storage, and receiving; at Fort Benjamin Harrison, the Army Finance Center, heating plant, utilities for Wherry Housing, and revisions to existing electrical system.

Also, at Granite City Engineering Depot, installation of electrical power, and open shed warehouses; at Terre Haute Ordnance, construction of secondary hardstands; at East Chicago Cast Armor Plant, additions to buildings and installation of heating system; at Kankakee Ordnance Works, miscellaneous buildings, re-erection of oleum plant, construction of pack houses and storage facilities, and the rehabilitation of T.N.T. and acid transfer lines, and of existing roads.

At the Joliet Ordnance Ammunition Center a pilot test laboratory was built, and at Kingsbury Ordnance Plant, there was relocation of electrical distribution, and rehabilitation of a cafeteria.

Hydraulics Meet Is Set for Oct.

Subjects ranging from power steering to jet engine control will be covered in papers to be presented at the 10th annual National Conference on Industrial Hydraulics Oct. 14 and 15 at the Sheraton hotel, Chicago.

The tentative program was announced by Carl E. Schmitz, MWSE, vice president in charge of sales for Crane Packing company, Chicago, who will serve as conference director.

He said sessions will be conducted this year on automotive applications, presses, pumps, aircraft, components, machine tools, materials handling, pneumatics, and fluids.

The annual meeting is sponsored by the Illinois Institute of Technology graduate school and Armour Research Foundation of Illinois Institute of Technology, Chicago.

Papers tentatively chosen for presentation include:

"Hydraulic Problems Encountered During Development of Engineer Equipment," by K. L. Treiber, chief, liaison branch, Engineer Research and Development Laboratories, Fort Belvoir, Va.

"Chrysler Power Flite Transmission," by W. R. Rodger, supervisor, Mechanical Laboratories, Chrysler Corporation, Detroit.

"Power for Power Steering," by E. S. Witchger, sales manager, Eaton Manufacturing company, pump division, Detroit.

"Unit Mounting of Pump and Control Units Directly on the Cylinder," by F. G. Cizek, assistant chief engineer, American Steel Foundries, Elmes Engineering division, Cincinnati.

"Evaluating Piston Pumps and Motors for High Performance Hydraulic Systems," by R. H. Marvin, Franklin Institute, Philadelphia.

"Servo Controls as Applied to Variable Displacement Pumps," by J. Wesley Broome, section head, servomechanisms department, Raytheon Manufacturing company, Newton, Mass.

"Jet Engine Control," by J. M. Eastman, research and development group, Bendix Products division, Bendix Aviation corporation, South Bend, Ind.

"Problems Encountered in Developing a Constant Speed Automatic Transmission for Aircraft Alternators," by R. G. Doolittle, group engineer, development engineering department, Sundstrand Aviation, Rockford, Ill.

"Heat: Its Generation and Natural Dissipation in Hydraulic Circuits," by J. K. Douglas, development engineer, Oilgear company, Milwaukee.

"Heat: Forced Convection Removal From Industrial Hydraulic Circuits," by D. W. Retzinger, contract products division, Young Radiator company, Racine, Wis.

"The Use of Hydraulics for Machine Tools in Europe," by R. Richardson, general manager, Stein and Atkinson, Ltd., London, England.

"Hydraulics as Applied to Automation," by Walter Schroeder, project engineer, chief research engineering, Cincinnati Milling Machine company, Cincinnati.

"Hydraulics Valves and Systems for Lift Truck Operation for Various Material Handling Needs," by E. J. Hrdlicka, manager, Hydreco division, New York Air Brake company, Cleveland.

"Hydraulics Add Versatility to Modern Lift Trucks," by F. C. Schuster, chief engineer, material handling division, Buda company, Harvey, Ill.

"Development of Valves for the Control of Pneumatic Power," by J. L. Shearer and S. Y. Lee, Massachusetts Institute of Technology, Cambridge, Mass.

"Flow of High Pressure," by M. M. Slawsky, head of the pneumatics laboratory, National Bureau of Standards, Washington, D. C.

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Case To Do Research For Army on Metals

T. Keith Glennan, president of Case Institute of Technology, announced on June 25 in Cleveland the signing of a sizable government contract commissioning Case to engage in research in the study of possible replacement materials for critical metals used in Army medical equipment.

The two-year project, awarded by the Armed Forces Procurement Agency, will seek to conserve strategic metals that would be in short supply during war time. Two such metals are stainless steel and aluminum.

The contract calls for two general phases of research:

1) Study of the physical and chemical properties of possible replacement materials such as plastics, ceramics, wood and less critical metals.

2) Engineering design of specific items for later assembly into models for field and laboratory tests.

Studies also will include economy, sources of supply, continuity and availability of raw materials.

The research project will be supervised by the Department of Chemistry and Chemical Engineering which is headed at Case by Dr. William von Fischer.

George W. Blum, associate professor of chemical engineering, will be project director. His assistant will be Dr. Selby Skinner, senior research associate in chemistry.

The project will get underway with six research associates and five junior research assistants.

Items to be studied will include Army medical field equipment such as collapsible tubes, pharmaceutical containers, and structural equipment such as litters, tables, carrying cases and tanks.

The contract was signed by President T. Keith Glennan of Case, and Lt. Col. Howard F. Currie of the Armed Forces Procurement Agency, Brooklyn, N. Y.

Project work for the first six months will involve fact-finding and assembly of information, plus listing of specific research objectives.

A percentage of the contract money is expected to be used for subcontract work with outside agencies and industrial companies.

Factory of Future Approaches

The factory of the future—in which the workman's main job will be to watch over almost entirely automatic machines—moved closer to reality with disclosures by seven scientists of Westinghouse Electric Corporation in the fields of transistors and silicon rectifiers.

Speaking at the summer general meeting of the American Institute of Electrical Engineers in Los Angeles, June 21-25, the scientists told of developments which "will produce significant changes in virtually every major industry in the country."

The Westinghouse men who delivered technical papers at the meeting all are on the staff of the firm's materials engineering department in Pittsburgh, Pa. They are Dr. R. Louis Bright, Dr. G. F. Pittman, Jr., Dr. Robert A. Ramey, Dr. G. H. Royer, R. O. Decker, A. P. Kruper, and E. F. Losco.

One new device expected to have a far-reaching effect in any application that requires the conversion of alternating current to direct current is a new type of silicon rectifier described by Losco. This experimental device, which has no moving parts, has an efficiency of approximately 98 per cent—about 10 per cent better than the best motor-generator sets today.

It takes up only a fraction of the space and does the same job as equipment many times its size. While commercially available silicon rectifiers generally produce less than one watt of power, the new unit is capable of delivering a power output of more than 1,200 watts—enough to light 20 sixty-watt lamps or run a 1½ h.p. motor.

Westinghouse engineers believe the new rectifier, with modifications in size and power ratings, will find applications in computers, in aircraft, radio and television power supplies, electroplating processes, and possibly in the elimination of certain parts of motor-generator sets.

The technical papers by the other Westinghouse scientists dealt mainly with the new uses of transistors in circuits and devices which, in application, are expected to provide the extremely rugged, reliable and highly accurate controls necessary for the "automatic factory" of tomorrow.

Commenting on the papers, Dr. Stephen J. Angello, manager of the semi-conductor section in the Westinghouse materials engineering department, termed the information they contain as "at least one important key which will open a new era more significant than the Industrial Revolution."

"Three hundred years ago, we entered what became known as the era of the Industrial Revolution," Dr. Angello said. "At that time men began substituting mechanical power for animal muscle power. By World War II the art of using mechanical power had reached the point where practically all major work was being done by machines. In effect, machines took over the job of human muscles.

"Today, we are on the verge of developing complete 'nervous systems' for those mechanical muscles—nervous systems which will not only tell machines and entire production lines what to do

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but how to do it, when to do it, and how often to do it. The use of the new materials such as silicon, germanium, and others and such developments as are discussed in these Westinghouse technical papers will do much to expand the use of these 'nervous systems.'"

Citing the paper by Dr. Royer, which discussed the use of two transistors in a circuit to convert direct current to alternating current, Dr. Angello said the converter described is a device having no moving parts with an efficiency of 90 per cent compared to the 50 to 70 per cent efficiency of an oscillating converter.

The Royer development, Dr. Angelo said, makes possible light weight, high voltage power supplies and might be useful in Geiger counters and in wall and ceiling panels which will glow and thus light a room without conventional lighting fixtures. Because the device has no moving parts, it also would be useful in the power supply of photoflash equipment.

The paper delivered by Dr. Ramey discussed the use of transistors to improve the stability and sensitivity of magnetic amplifiers—devices already in use as important parts of control circuits in steel mills, paper mills and other industrial applications. By linking the transistors to the magnetic amplifier, Dr. Ramey said, it is possible to obtain a much higher amplification of a signal at lower power. Such a device would be useful, for example, in the measurement of temperatures in aircraft.

"The control devices used in the nation's production lines today have done and will continue to do their jobs well for years to come," Dr. Angello said. "But they have their disadvantages. This is true in the aircraft and automotive industries, the steel and paper industries, the textile and electrical industries, and many others where high speed accurate and reliable controls are necessary. Today's controls, however, whether electronic, rotating, or vibrating contact type, will wear out or will require replacement or continued periodic maintenance for various reasons. The advent of the magnetic amplifier has done much to eliminate many of the problems associated with previous type controls. The new controls will go even further.

"With the new controls that will be made possible as the result of such Westinghouse developments, it is unlikely that an entire paper mill, for example, would ever be shut down because a set of brushes on a rotating regulator wore out, or that an automobile factory would lose $100,000 in production time because some control stopped working when a few drops of oil dripped on it."

"The silicon rectifier is being considered for possible application in the aircraft industry," Dr. Angello said, "because of its ruggedness and its ability to operate efficiently at temperatures as high as 392 degrees Fahrenheit and higher. Rectifiers made of other materials such as germanium have a temperature limit of 140 degrees while a selenium rectifier has a temperature limit of 212 degrees in industrial applications.

"Such developments as these in transistors and silicon rectifiers are opening new horizons for modern man. Along with other discoveries being made almost daily, they portend a new era of new and better products at lower costs and in greater quantities."

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Telephone Booth Bespeaks Advance

Telephone users will be able to speak and hear with less effort in a new type triangular telephone booth.

Providing better privacy and ventilation are two advantages of the unique booth designed by acoustics experts at Armour Research Foundation of Illinois Institute of Technology, Chicago.

The booth was developed for the Architectural Products division of Burgess-Manning corporation, Chicago, longtime manufacturer of doorless telephone booths. The new booths recently went into production.

The triangular telephone booth has the bottom and one side open. Only 36 inches high, it encloses the head and shoulders of the user and extends downward to waist level. It can be mounted directly on a wall or placed on a stand.

In addition to being easier to clean and light, the booth is more economical to build in proportion to the privacy provided. Spacewise, two booths can be mounted in the ordinary room corner where only one box-type booth would fit.

The unusual effectiveness of the booth in eliminating distractions is due to the combination of the new shape and the manner of placing sound-absorbing material between its double walls, according to Dr. Howard C. Hardy, assistant manager of the physics research department at Armour Research Foundation.

Telephone booths of the partial-enclosure type have been built before, Hardy said. But this design was shown, after nearly a full year of research, to have the most practical characteristics in relation to space and other demands.

At the back, the booth comes to a 45 degree angle, a feature that permits a variety of mounting combinations. For example, four booths can be placed next to each other on a wall to form a straight line of 180 degrees.

Eight booths, placed back-to-back on two sides of a partition require about as much space as four conventional booths. They also can be grouped in a circle around a pillar or in rows.

"There's almost no limit to the number of arrangements possible," Hardy said. "And all of them use less room than square booths."

Army Engineer Divisions Merge

Consolidation of the Army Engineers' Upper Mississippi Valley Division, St. Louis, Missouri, and the Great Lakes Division, Chicago, Illinois, into a new North Central Division, with headquarters at Chicago, and the placing of the St. Louis District in the Lower Mississippi Valley Division, has been announced by Major General S. D. Sturgis, Jr., chief of engineers.

The consolidation, scheduled for initiation June 30, 1954, and to be completed Sept. 1, has been directed because of reduced workload and in the interest of maximum economy and improved public service.

Under the consolidation, these actions would occur:

1. The Upper Mississippi Valley Division Office, located at 901 Washington Avenue, St. Louis, Missouri, will be discontinued.

2. The St. Louis District Office, located at 420 Locust Street, St. Louis, Mo., will be placed under the Lower Mississippi Valley Division, whose headquarters are at Vicksburg, Miss.

3. Rock Island District, Rock Island, Ill., and St. Paul District, St. Paul, Minn., will be placed under the new North Central Division, Chicago.

4. Functions and responsibilities of the presently constituted Upper Mississippi Valley Division will be merged with the Great Lakes Division and the Lower Mississippi Valley Division, with a resultant savings in personnel and office costs. Present strength of the Upper Mississippi Valley Division Office is small, comprising only 54 civilians and two officers. This constitutes only about four per cent of Corps of Engineer employees in St. Louis and these are the only personnel in this area who will be affected. The consolidation does not alter the current locations and functions of the various Districts in the three affected Divisions.

It is estimated that the consolidation will result in annual savings of about $100,000, and this action is being taken in accordance with budgetary planning for the next fiscal year. Apart from the financial savings, the merger will permit a better utilization of the existing staffs of the three Division Offices involved. Not only will the merged technical staff be stronger, but the consolidation will permit a greater utilization of available professional engineering talents, and a more uniform workload will be possible. The new North Central Division headquarters are conveniently located to the area to be served.

Colonel Wendell P. Trower, now Great Lakes Division Engineer, will remain in Chicago as head of the new North Central Division. No announcement has been made of the new assignment for Colonel Delbert B. Freeman, now Upper Mississippi Valley Division Engineer. Brigadier General John R. Hardin is the Division Engineer, Lower Mississippi Valley Division, at Vicksburg, Mississippi.

Prior to World War II, particularly from 1930 on, the Upper Mississippi Valley Division was primarily concerned with the civil works program assigned to the Corps of Engineers. It was intensively engaged in the construction of the series of locks and dams canalizing the Upper Mississippi River to Minneapolis, as well as channel improvement between the Missouri and Ohio rivers. Subsequent to 1938, the work of the Division has also included the construction of flood protection works. Since World War II, the workload has declined. Currently, the Division Office has no military construction responsibilties.

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A. C. Monteith To Be New AIEE President

The nation's engineers are doing fine with the slide rule but are permitting themselves to be overlooked when government and business seek to fill positions of management and leadership, A. C. Monteith, the newly-elected leader of the country's electrical engineers, said recently.

Monteith, taking office August 1 as the new president of the American Institute of Electrical Engineers, is vice president in charge of engineering and research for Westinghouse Electric Corporation. He urges that a broad educational program be started to acquaint government and business with the achievements and capabilities of engineers and the importance of their work.

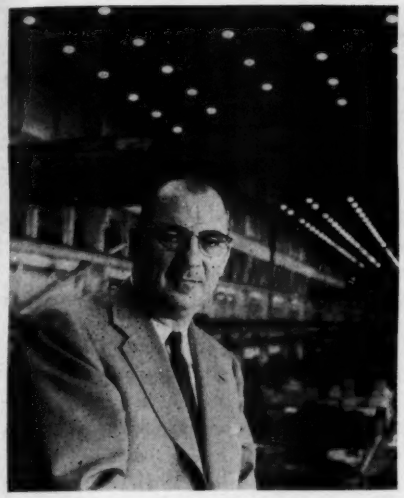
After accepting the "president's badge" at the AIEE annual summer meeting in Los Angeles, Calif. he said:

"We do a wonderful job of running the slide rule but only a fair job of interpreting what we are doing to the man who benefits from our labor. We take too much for granted."

Although there are twice as many engineers as attorneys in the country, 28 of the 48 state governors are attorneys and none is an engineer, Monteith pointed out. There are 53 lawyers and only two engineers among the 96 U. S. Senators.

"Yet, here are men who are responsible for the spending of billions of dollars for national defense and for improvement of our standard of living," he said. "These men deal daily with the fruits of engineering accomplishments.

"At times we wonder whether we can measure up, but when we see men such as Charles Wilson, now Secretary of Defense, . . . making outstanding contributions to this country, we gain confidence and should strive to place



A. C. Monteith

more engineers in these responsible positions."

This broad educational program is but one of two "areas that need our concentrated attention," the AIEE president told his audience. The other, he said, is to press for greater cooperation among the various branches of engineering.

"Every effort must be made to bring all branches of engineering together into a unified, cooperating group and to set out for common objectives," he declared.

"These then are the two great challenges we face. In the coming years, we will strive to weld our branches into a more closely knit, integrated Institute and affiliate it more effectively with the larger society of engineering. Second, a broad educational program is essential to inspire and guide the newer members of our profession and to acquaint government and business with the tremendous contributions engineers are capable of bringing to positions of management and leadership," Monteith concluded.

A young man just out of university sought the advice of a hard-headed and successful engineer. "Tell me, Sir, how shall I go about getting a start in the great game of business."

"Sell your wrist watch and buy an alarm clock," the engineer laconically replied.

Atom-Power Students Advised by Witzke

The engineering student seeking a career in the new field of atomic power should concentrate on a fundamental engineering education and leave the specialized training to his ultimate employer, an atomic power executive of the Westinghouse Electric Corporation advised on June 20.

Addressing the International Nuclear Engineering Congress in session at Ann Arbor, Mich., R. L. Witzke, manager of industrial atomic power for the Westinghouse Atomic Power Division, Pittsburgh, Pa., warned against "overspecialization" in the college curriculum.

"The tendency toward professional specialization," he said, "is now building up pressure in the nuclear energy field . . . Westinghouse, with its many interests in atomic power, is hopeful that this new and intriguing activity will not produce any drastic change in the present college curriculum. From experience to date we are satisfied that concentration on fundamentals will produce the best engineers for careers in this field."

Many colleges in the past few years, Witzke said, have revised their academic programs and introduced new courses of study in specialized technical subjects.

"The results," he added, "have been far from satisfactory, and the trend is now back to a concentration on fundamentals, with the specialized training left to the employer."

Some changes in college curricula are in order, of course, the speaker said, but the problem is to determine the nature and degree of these changes.

He pointed out that Westinghouse maintains a training program for engineers and that even this program is not specialized to the extent that some would prefer.

"Our training course, although more specialized than the college curriculum, is organized on a broad general base," Witzke declared. "Specialized training is obtained 'on-the-job' after the student finds his slot in the organization. The engineer can also register for any of a large number of night-school courses given as part of a cooperative program with local colleges and universities."

The Westinghouse Atomic Power Division executive told of a questionnaire which was circulated throughout the Division to obtain on-the-job opinions as to proper educational background and training.

Among other facts, the survey found that 59 per cent of the engineers and scientists who answered the questionnaire feel that their work "parallels plans they had in mind during their undergraduate days."

"This is significant," Witzke pointed out, "when only a small part of those in the Division could have considered the atomic power field in planning for the future."

About 70 per cent of those surveyed felt that all or most of their college courses were generally useful even though atomic power, in most cases, was not considered in selecting courses taken. But 88 per cent indicated they would plan their college curricula differently if they had had their present positions in mind. More than 90 per cent believe additional study now would be helpful.

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SPECIAL NOTICE

Wednesday June 30th, 1954 was the last Wednesday night the office was scheduled to be open evenings until after Labor Day. Watch this space for the announcement telling when we will resume being open one night a week.

Bonnell H. Allen, Manager

POSITIONS AVAILABLE

C-1938(a) DIE DESIGNER—Age: up to 45. 5 plus yrs. exp. in die design work and preferably bending die. Knowledge of operation of press brakes and notching presses. Duties: Start as die designer and if capable will lead to department head. For a manufacturer of special heavy equipment. Salary: $550-$660 per month. Employer will pay fee. Location: W. Pa.

C-1951 SALES MANAGER 5 plus yrs. exp. in sales management of heavy transformer (power). Duties: heading up sales organization of about 20 men selling mostly to contractors and O.E.M.'s. For a manufacturer of transformers. Sal: $8-9000 plus override. Employer will negotiate fee. Loc: Chgo.

C-1955 MAINTENANCE ENGINEER Age: 25-45 3 plus yrs. exp. in heat, lighting, and power maintenance. Knowledge of remodeling. Duties: maintenance problems of a chain of 17 stores in more or less of a staff capacity. For firm of retail stores. Sal: $6-8000 per yr. Location: Chicago.

C-1956 ESTIMATOR—Age: 30-45. 5 plus yrs. exp. estimating fabricated steel and structural shapes. Duties: estimating structural steel fabrications. For a fabricator of structural steel. Sal: $6000. Employer will negotiate fee. Loc: Calumet Dist.

C-1966 APPLICATION ENGINEER EE Age: 25-30. 2 plus yrs. exp. in utilities or heavy industrial users of power. Knowledge of high-voltage equipment. Duties: application work in sales department of manufacturer of high voltage equipment. Can lead into sales eventually, if desired. For a manufacturer. Employer will pay fee. Sal: $4800-7200 per yr. Location: Chicago.

C-1971 CHIEF INDUSTRIAL ENGINEER Age: 35-45 5 plus yrs. exp. in top supervisory position in industrial engineering. Knowledge of wood-working helpful. Duties: supervising complete revision of incentive system and all other industrial engineering functions covering costs, methods, time study, etc. For a manufacturer of wood products. Sal: Open. Location: Wisconsin.

C-1972 STRUCTURAL DESIGNER — Grad. CE or Struct. 3 plus yrs. exp. in steel and concrete on power plants. Knowledge of hydro-electric plants. Duties: steel and concrete design on power and hydro-electric plant. For a consulting engineer. Salary: about $6000 per year. Location: Chicago.

C-1981 FOUNDRY MANAGER DEGREE in Engrg. Age: 35-45. Know: Gray Iron Foundry Practice, Met. Duties: Manager of foundry resp. for operations and sales. Report to president of Company. Superintendent will report to applicant. Salary: Up to $12,000. Location: Chicago. Employer will neg. fee.

C-1987 ADMINISTRATION ENGINEER. Age: 40-45 5 plus yrs. exp. in administrative capacity for utility handling power production, transmission and distribution operations. Duties: administrative work with an electric utility servicing 125 central states area communities and 100,000 customers. For an electric utility. Sal: $12,000. Location: Midwest.

C-1989 CHIEF OF PARTY—land surveying. 1 plus yrs. exp. in legal land surveying in recent years in metropolitan areas. Knowledge of legal boundry surveying. Duties: take charge of party to make lot surveys in Chicago Area. Should know rectangular systems of surveys. Sal: $5000 to $7000. Employer may go higher. Employer will negotiate fee. Location: Chicago.

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913 MW IND. MGMT. ENGR. 39 Twelve yrs. doing installations, wage incentive, methods, cost estimating, time study, plant layout and standards. Ten yrs. charge of job lot cost dept. in mechanics hand tools. $8000 Midwest.

914 MW FACTORY MGR. Met. 38 Six yrs. sales and metallurgical service. Nine yrs. processing and quality control and liaison between customer and mill. $12,000 US.

916 MW RESIDENT ENGR. CE 28 Two yrs. highway and drainage design, resident engr. and material handling. Ten mos. design, estimating, plant layout, maintenance of equipment and machinery. $5400 Midwest.

917 MW FIELD ENGR. CE 27 Two yrs. structural steel detail draftsman. Nine mos. field engr. on segment of large construction project. $4800 Chicago.

918 MW JUNIOR CIVIL CE 26 One yr. designing, drafting, quantity take off, progress and quantity reports. Nine mos. design and drafting of hydraulic projects. $5000 Chicago.

919 MW CONSTR. SUPT. CE 44 Three yrs. design, estimate and supervision of steel and concrete structures. One yr. supervise field parties for oil refinery. $6000 U.S.

920 MW OFF. ENGR. CE 35 Nineteen mos. supervision of constr. for a consulting engr. Six yrs. estimating, personnel and supv. of constr. for contractor. Two yrs. railway bridge draftsman. $7000 Chicago.

Education Fund Is Established

A $5,000 annual fund has been established at Illinois Institute of Technology by a Chicago industrial firm primarily to assist liberal arts students in acquiring an engineering education.

The grant, initiated by the Industrial Filter and Pump Manufacturing company, 5900 Ogden avenue, Chicago, is one of the first created in the nation to emphasize the value of a combined liberal arts and engineering education.

In establishing the fund, named in honor of Tom Lundberg, of Coloma, Wis., founder and president of the company, the need for engineers with well-rounded educational backgrounds was stressed.

"We are encouraging liberal arts students to secure a technological education because industry today is demanding more of the engineer than a specialized education alone can provide," it was explained by Ralph E. Liedberg, executive vice president of the company.

"It is becoming more and more evident," he commented, "that industry needs men with engineering training who also have the liberal arts background that will help them see engineering as a means to an end, not an end in itself."

The company builds industrial equipment for the metal finishing fields, oil refineries, and chemical and food processing plants throughout the world.

The fund provides four $1,000 scholarships and $1,000 in essay prize money to be awarded each year. The scholarships meet all tuition costs and will provide the holders with $350 for living expenses. The $1,000 prize money will be divided each year among upperclassmen engineering students at Illinois Tech who write the best essays on engineering or related subjects.

The scholarships will go to students who transfer to Illinois Tech for two years of engineering education after completing three years of liberal arts studies at one of the Midwest colleges participating with IIT in providing a liberal arts-engineering curriculum for students seeking a combined education in the two fields. Students who complete the curriculum are awarded two degrees, a bachelor of arts degree from their original college and a bachelor of science degree from IIT.

The scholarships will be newly granted each year to two incoming students who transfer to Illinois Tech. They will be eligible to receive the two other scholarships during their second and final year of engineering education, providing their scholastic record has been satisfactory.

Further information about the awards may be secured from the chairman of the scholarship committee at Illinois Institute of Technology, Chicago, or from the deans of the cooperating liberal arts colleges.

Son (entering office)—"Well, dad, I just ran up here to say hello."

Engineer—"Too late, my boy. Your mother just ran up here to say hello, and she took all my change."

On Training—
Letters from Leaders

In the last issue of Midwest Engineer we published another of about thirty letters received from leaders of Chicago-area firms concerning shortcomings noted in the engineers in their employ.

We are printing another of these letters in this isssue, as we shall do in future issues.

Dear Mr. Becker:

In reviewing the needs of young engineers who hope to qualify for future supervisory positions, the one great lack which we notice is "cost consciousness." The young engineer realizes that we must make a profit on our various operations, but the large number of factors which must be considered in the cost of a product is not clear to him. He has very little conception of the economic relationships that exist between our various industries and even between different departments of one company. Until he realizes the importance of all the factors that make up the cost of a product or an operation and the relationships between the various segments of our business, industrial, and political economy, his value as a potential supervisor, certainly as an executive, is questionable.

Anything which the Western Society of Engineers can do to develop a real understanding of these economic factors in the minds of our young engineers will help not only the engineer himself but also the industry which he serves.

Very truly yours,

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Sound Chamber Tests Jet Noises

A high intensity sound chamber has been developed to test, on a laboratory basis, the effects of jet and rocket engine noises on electronic components used in aircraft.

The chamber, dubbed the "sound box," was built by scientists at Armour Research Foundation of Illinois Institute of Technology, Chicago.

Constructed in the shape of a 6-inch cube, the chamber is used in evaluating electron tubes and other components employed in communication, guidance, and armament systems on jet and rocket driven aircraft and missiles.

The sound box was designed for use in an Air Force research project seeking to determine methods for improving reliability of airborne electronic components to make them less vulnerable to vibration, acoustics, and shock disturbances.

The project, begun two years ago, is being carried on by Armour Research Foundation under contract with the Wright Air Development center, near Dayton, Ohio.

Because of the tremendous noise produced in modern jet aircraft, it has become necessary to develop soundproof electronic components in order to prevent malfunctions or complete failure of the equipment, according to Fred Mintz, supervisor of mechanics instrumentation and vibration, and Marvin B. Levine, MWSE, research engineer, both of the Foundation.

The sound box, operating as a reverberant chamber, permits production of high sound levels with only a modest power input. Because of its simplicity, the chamber is an inexpensive and convenient laboratory device, they said.

Noises of 150 decibels—the usual jet engine noises encountered at some important measuring points—can be produced and utilized in the box.

A decibel is a unit of sound measurement where zero decibel represents the lowest level of human hearing and 100 decibels approximate the noise in a boiler factory.

A sound level of 150 decibels is 100,000 times more intense than boiler factory noise and is sufficient to cause pain in the human ear, Mintz and Levine explained.

Tape recordings of actual jet noises could be used with the sound box, but in practice this is not necessary. Instead, sounds fed into the box are supplied by a random noise generator, a device that generates a noise similar to that of jet engines, and by an audio-oscillator, an instrument for electrically generating pure tone sounds.

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Tool Engineering

(Continued from Page 6)

the group. Suddenly the group realizes that it has followed an historical pattern and has laid the cornerstone of a new professional society.

With the actual founding of the professional society a clearer concept develops as to the profession itself. Since a constitution and by-laws must now be drawn up, the professional and ethical qualifications which entitle other individuals to become members of the young society, have to be established. The character of the profession is now defined.

Progress becomes more rapid. As the new professional society grows in size and stature the profession it represents and the individual members of that profession achieve increasing recognition. Membership in the society becomes a valuable asset, if not an essential to each member of the profession, be he a doctor, a lawyer, an educator—or a tool engineer.

Young as the American Society of Tool Engineers still is, I believe that it represents a profession which, more than any other, sets our own civilization apart from all previous civilizations. Never before has any civilization made so great a use of tools—factories; machines; conveyors; hydraulic, mechanical and electrical devices; cutting tools; jigs and fixtures, and the like. Never before has any civilization achieved so great and free a collaboration between tool engineers in the plants of machine manufacturers, of tool manufacturers and of machine and tool users.

More and more we, as a Nation, are all finally coming to realize that the wealth and economic strength of our civilization is not measured by how many bathtubs, automobiles, telephones, radios and TV sets we own. Rather, we now know, our future welfare and security is dependent on *our continued ability to use "tools" to produce* these things and other things *faster, better and with less physical effort.* It took all of us a long time to learn this simple fact. It took us a long time for the simple reason that the profession of tool engineering followed the pattern of all other professions.

Since the early tool engineers considered themselves craftsmen, they were so busy doing, thinking and originating that they did not even stop to evaluate their own vital position in modern society. Even a top-flight tool engineer was and frequently still is called a "master mechanic." Since tool engineering has only recently become a recognized profession, colleges provided no courses designed to develop and train such engineers. Neither did secondary schools have much to offer in preparing a young man for this specialized field. No engineering society concerned itself to any extent with men whose interests lay in the techniques of and equipment for production. It is only 20 years ago when a few individual tool engineers began to recognize the wide gulf between their own occupation and that of craftsmen and founded the long overdue American Society of Tool Engineers. The growth of the ASTE which followed the awakening of the professional concept was spectacular and spontaneous.

In retrospect, this is hardly surprising. Tool engineering itself had come of age. It had been ready for full professional status for some time.

It is a vital force but one as yet little known by the man in the street. The breaking down of industrial barriers, the free exchange of information, the enormous and vital cooperation between manufacturers and users of tools, and what these things promise for the future, are things with which you gentlemen may be completely familiar but about which the public knows very little.

How often do we still hear claims that industrial progress is slowing down? How often do we hear cries for a planned economy based on the freezing of industrial products and processes? Far too frequently, in my opinion. I sincerely believe that we are still near the dawn of our technical development. I say this advisedly because the engineer only recently has recognized that he must look beyond the field of his daily work for the significance of what he is doing or what he should plan for tomorrow. If this is true of engineers in the older professions, it is doubly true of the tool engineer.

The day when engineers were wedded to their slide rules and handbooks is over. Today's and tomorrow's engineer must look far beyond his normal horizons. He must and he is beginning to take an active interest in things which rarely concerned him before. In the future, you are going to find more and more engineers functioning as the heads of businesses of all kinds. You will find more and more engineers in local, state and federal governments. You will find more and more actively contributing to and supporting the development of the arts and culture of the Nation. This is an essential. If our civilization is based on engineering, then engineers inevitably must take upon themselves a major part of the responsibility for guiding the destinies of that civilization.

It is the social responsibility of engineers, whether they design tools or develop the processes and methods for using these tools, that they must look to the social implications thereof. But you will find that as engineers do this, the broadening of their own horizons, the fresh viewpoints they acquire, will provide a new stimulus to vast advances in the more technical phases of their daily life.

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What bothers me and bothers many of you, I am sure, is our terrific shortage of competent engineers. The burden which the technical foundation of our civilization has laid upon our educational institutions is a severe one. It is they who, to a large extent, must lay the groundwork for the development of engineers not only from a professional standpoint but also as social entities. It is true that some of our great tool engineers have achieved their position without the benefit of thorough and well-thought-out education. That is enormously to their credit. But the road of the self-made man is always a difficult one and a road that few can travel all the way. Nowhere is this more true than in tool engineering. Perhaps we cannot adequately prepare a man in schools and colleges for the profession of "tool engineering." I am not convinced of this. I recognize that it is not an easy job but I do *not* believe it is impossible. I believe we must find the ways and means to do this. We must educate our educators by giving them a better understanding of what is needed to make a good tool engineer. We are trying to do this. And after we get through with this, we must provide for a multiplication of our educational facilities. We cannot and should not depend on government, either federal or state, in this regard. Industry itself must take a hand.

If all the young men who *should* be taking engineering today would apply to our engineering colleges for admission, they could not be accommodated. If this is true in the mechanical, electrical, chemical and other professions, imagine how far more true it is in the profession of tool engineering — a profession for which there are almost no educational facilities available today. If you think I am overstressing this point, please remember that it is only in our ability to produce and continue to out-produce that our nation leads the world. We must maintain that leadership. We cannot do this by standing still. We cannot do it without tool engineers, and time will not wait for us.

Other nations are entirely too able to recognize that they themselves can accomplish, at least from a technical standpoint, what we have achieved. That they will attempt to do so it without question. Already Russia is passing us in the number of engineers graduated annually. I doubt if any of you would like to look forward to transferring the technological leadership to a nation or nations who have no respect for the rights of an individual. I know I don't want it and I will do everything I can within my own limited powers to see that it doesn't happen.

I feel very humble in visualizing the tasks ahead of all of us. But I certainly am proud to be part of a group of professions in whom has been entrusted the future welfare of an entire civilization.

Arthur C. Harper Gets AS of EE Award

Arthur C. Harper, president emeritus of the Wyomissing Polytechnic Institute, Wyomissing, Pennsylvania, and former head of the Industrial Mechanical Engineering Department at Pratt Institute, New York City, was presented with the James H. McGraw Award in Technical Institute Education, June 15, at the Technical Institute Division Annual Dinner which is part of the American Society for Engineering Education Meeting at the University of Illinois, Urbana. Harper is the fifth recipient of this award.

Presentation was made by L. E. Grinter, MWSE dean of the Graduate School, University of Florida, and president of the American Society for Engineering Education.

The James H. McGraw Award in Technical Institute Education is an annual award of $500.00 for outstanding contributions to this field of education. The Award is administered by the Technical Institute Division of the American Society for Engineering Education and is sponsored by the McGraw-Hill Book Company of New York.

Arthur C. Harper, born in Bellefonte, Pennsylvania, received his education at The Pennsylvania State College. His career in education began in 1907 when he joined the Penn State faculty as an instructor in engineering subjects.

During succeeding years he taught at Ohio State University, where he worked on the first edition of French's *Engineering Drawing;* at the University of Illinois; and at Pratt Institute. In 1925, after four years as head instructor, he was named head of Pratt's Department of Industrial Mechanical Engineering. During his eleven years at Pratt, he personally revised all courses in drawing and engineering design.

In 1931 Arthur Harper returned to his native Pennsylvania as director of Wyomissing Polytechnic Institute. He was elected to the presidency in 1933 and served in that post until his retirement in 1952.

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Reviews of Technical Books

Stress

Formulas for Stress and Strain, by Raymond J. Roark, McGraw-Hill Book Company, Inc., New York, 3rd Edition, 1954. 381 pages. $7.50.

This excellent handbook for engineers who are concerned with machine and structural design has been revised and extended to bring the text in line with latest available information. Important new material has been added on sheer lag; sheer and deflection of circular arches; flat plates with large deflections; pressure vessels and shells; stress deflection, and edge slope of flat plates; stress concentrations. The list of references has been extended to include many recently published books and papers. The book covers a great number and variety of cases in a usable form. The formulas and coefficients associated with the formulas are given in a convenient tabular form. This book can serve as an excellent auxiliary textbook for any one concerned with stress analysis and elasticity.

B.A.W., W.S.E.

Airplane Structures

Airplane Structures, Volume I, fourth edition, by Alfred S. Niles and Joseph S. Newell, John Wiley & Sons, New York, 1954. 607 pages. $7.75.

This book has been almost entirely rewritten to reflect the developments of recent years.

The effective application of the principles of stress analysis remains the primary objective of this volume. A study of the general theory of structures, the book emphasizes methods appropriate to the analysis of structures in which high strength/weight ratios are essential. Procedures have been selected on the basis of their importance to aeronautical engineers, but are equally applicable to such non-aeronautical structures as bridges, buildings, machines, and vehicles.

Perhaps the most important change in the new edition is the increased emphasis on thin metal construction, through improved coverage of incomplete-tension field and constant-shear-flow webs, patterns of internal stress distribution, combined bending and torsion of shells, plate buckling, and local instability failures. Besides this, an entirely new chapter has been added on the physical properties of structural materials. Promising methods for the analysis of lap joints, based on recent research at the Massachusetts Institute of Technology, now appear in the chapter on connections. Formerly in the second volume, the exposition of the basic Maxwell-Mohr method for the analysis of statically indeterminate structures has been revised and included here. These and other changes are introduced at the volume's customary level, one which stands between elementary books on strength of materials, and advanced treatises on theories of structure, elasticity, and plasticity.

R.C.

Graphics

Graphics in Engineering and Science, by Alexander S. Levens, John Wiley & Sons, New York, 1954. 696 pages. $7.00.

The principal objective of *Graphics in Engineering and Science* is to promote the use of graphics as a language. Employed concurrently with the English language and the language of symbols, as the author points out, graphics becomes a working tool rather than an end in itself.

The book stresses fundamentals and their applications to the problems that arise in technology. Part I of Levens' work, dealing with orthogonal projection, applies basic concepts to a variety of problems and emphasizes the analysis necessary for their solution. In Part II, "Technical Drawing Practices," the author deals with recognized standards, the importance of technique, and the development of facile free-hand drawings as a means towards intelligible expression. Part III is concerned with graphical solutions and computations.

Characterized by a complete integration of its three major divisions, the book demonstrates the effective application of graphic elements to design, research, and development, and invites further coordination with such topics as mathematics, mechanics, and strength of materials. The author presumes a reasonable proficiency in the use of instruments, lettering, and simple geometric constructions, but provides thorough references to this background material in six appendixes.

Accompanying *Graphics in Engineering and Science*, are two workbooks, the first coinciding with Part I of the text, and the second relating to Parts II and III.

Professor of Engineering Design at the University of California in Berkeley, Levens is also the author of *Nomography*. A. E. Edstrom of City College in San Francisco collaborated in the preparation of the problem sheets.

R.C.

WSE Personals

Arne E. Uitti, MWSE, was elected vice-president of Lindberg Steel Treating Co., in charge of operations at a recent stockholders meeting.

* * *

Robert H. Bacon, MWSE, president, R. H. Bacon & Co., won Honorable Mention in the Union League Color Slide Competition. His entry was "Indian Pottery Painters," taken at Guadalajara.

* * *

The firm of De Leuw and Brill announce that on May 1, 1954, **Le Roy H. Cather,** MWSE, became a general partner and the firm name was changed to De Leuw, Cather & Brill.

* * *

Effective July 1, 1954, **Philip J. Larson,** MWSE, has been appointed senior contracting manager, Chicago District Office of American Bridge Division, 208 So. La Salle st., Chicago. He succeeds W. B. Hunter who has been appointed senior contracting manager, New York District Office.

* * *

John J. Ahern, MWSE, director of the department of fire protection and safety engineering at Illinois Institute of Technology, Chicago, has been appointed fire protection consultant to the Department of Defense.

One of the nation's leading experts on fires and fire protection, Ahern will serve as special consultant in the office of the Assistant Secretary of Defense in charge of properties and installations.

Ahern is president of the Greater Chicago Safety Council and recently was reappointed to the Civil Service Commission of Chicago.

He was a member of the Mayor's committee that investigated Chicago's LaSalle hotel fire, an advisor to the committee for revision of the Chicago City building code, and chairman of a special coroner's jury which investigated a Chicago streetcar-gasoline truck fire which took 34 lives in May, 1950.

Ahern served as secretary of the President's Conference on Fire Protection in 1947, and from 1942 to 1945, he was with the Ordnance department of the Army as a fire protection and safety engineer. While with the Ordnance department, he organized and conducted war-training programs in explosives and industrial safety.

A graduate of Illinois Tech, Ahern received his bachelor's degree in fire protection engineering in 1935. Following graduation, he worked as a fire protection engineer for the Michigan Inspection bureau. In 1939, he became a special agent for the Insurance Company of North America, Detroit.

He joined the Illinois Tech faculty in 1945 as professor and director of the Institute's department of fire protection and safety engineering.

Ahern is a consultant of several major insurance, industrial, and utility companies and the Chicago fire department. He is a past president of the Society of Fire Protection Engineers.

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Rettaliata Tells Building Names

Two apartment buildings under construction at Illinois Institute of Technology, Chicago, have been named for men who have played major roles in the Institute's establishment and development.

President John T. Rettaliata has announced that the new $1,150,000 structures honor James D. Cunningham, MWSE, president of the Republic Flow Meters company, and Alex D. Bailey, MWSE retired vice president of Commonwealth Edison company.

The two men were instrumental in the formation of Illinois Tech in 1940 through the merger of Armour Institute of Technology and Lewis Institute.

Their interest in the Institute's development has continued to the present. Cunningham and Bailey have served respectively as chairman and vice chairman of the IIT board of trustees since its formation.

The apartments, which will house married students and staff members, are expected to be ready for occupancy during the spring of 1955.

Both buildings are under construction in the same block with Carman and Gunsaulus halls, the Institute's two completed apartment buildings. The block is bounded by 31st and 32nd streets and Michigan and Wabash avenues.

Both structures designed by Ludwig Mies van der Rohe, director of Illinois Tech's department of architecture and campus architect, are to be similar in appearance to Carman hall, but will have different-sized dwelling units.

The apartment at 31st street and Michigan avenue, to be named after Cunningham, will have 56 units of six, five, and two rooms. Bailey hall, at 31st street and Wabash avenue, will have 88 units of four, three, and two rooms.

The two buildings represent the 17th and 18th buildings to be constructed in little more than a decade at Technology Center, the name used to describe the study-work-living area rising on Chicago's near south side.

Cunningham, a past president of the American Society of Mechanical Engineers and the Illinois Manufacturers association, became a member of the Armour Institute board of trustees in July, 1932 and later was president.

In 1911 he founded the Steam Appliance company, known today as Republic Flow Meters company, manufacturer of industrial instruments and controls. He lives in Winnetka.

Bailey was graduated from Lewis Institute in 1903 with a degree of mechanical engineer. He served as chairman of its board of trustees from 1936 to 1940. Prominent in various electrical and mechanical engineering societies, Bailey recently was elected president of the Union League Club of Chicago.

A resident of LaGrange, he retired as vice president of Commonwealth Edison company on Feb. 1, 1952 after being with the firm for almost 50 years.

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Pictured in the photograph above are: (left) the primary filter bed with Rotary Distributor, (right center) the converted Imhoff Tank fitted with Floating Covers, (right) the revised fixed nozzle filter.

Further information on Arlington Heights equipment is yours upon request.

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